

WHAT IS CLAIMED IS:

1. A method for updating an element of a storage drive of a drive array, comprising the steps of:

5 updating the element of a spare storage drive;
substituting the spare storage drive for a first storage drive in the drive array having an unupdated element;
updating the element in the first storage drive; and
substituting the first storage drive for the spare storage drive.

10 2. The method for updating an element of a storage drive of a drive array of claim 1, wherein the element being updated in each storage drive in the storage array is the firmware of the storage drive.

15 3. The method for updating an element of a storage drive of a drive array of claim 2, wherein the drive array operates according to a fault tolerant storage methodology.

4. The method for updating an element of a storage drive of a drive array of claim 3, wherein the drive array operates according to a RAID Level 5 storage methodology.

20 5. The method for updating an element of a storage drive of a drive array of claim 4, further comprising the step of, upon a read to the spare storage drive during the period that the spare storage drive is present in the drive array, building the content of the spare storage drive with reference to the content of the remainder of the storage drives of the drive array.

6. The method for updating an element of a storage drive of a drive array of claim 1, further comprising the step of building the content of the first storage drive with reference to the content of the remainder of the storage drives of the drive array.

5

7. The method for updating an element of a storage drive of a drive array of claim 6, wherein the step of building the content of the first storage drive with reference to the content of the remainder of the storage drives of the drive array comprises the step of building the content of the spare storage drive by performing for each strip of data in the spare storage drive an exclusive-OR calculation on the remainder of the strips of each stripe in the storage drive.

10

8. The method for updating an element of a storage drive of a drive array of claim 6, further comprising the steps of:

providing a list of those addresses in the spare storage drive that include data that was modified during the period that the spare storage drive was substituted for the first storage drive; and

15

writing the contents of those addresses in the spare storage drive to the corresponding addresses in the first storage drive.

9. A method for updating the firmware of one or more storage drives in a drive array, comprising the steps of:

updating the firmware of a spare storage drive;
substituting the spare storage drive for a first storage drive of the drive array;
5 updating the firmware of the first storage drive; and
substituting the first storage drive for the spare storage drive of the drive array.

10. The method for updating the firmware of one or more storage drives in a drive array of claim 9, further comprising the step of building the content of the first storage drive on the basis
10 of the content of the other storage drives of the drive array.

11. The method for updating the firmware of one or more storage drives in a drive array of claim 10, further comprising the steps of:

providing a list of those addresses in the spare storage drive that include data that was
15 modified during the period that the spare storage drive was substituted for the first storage drive; and
writing the contents of those addresses in the spare storage drive to the corresponding
addresses in the first storage drive in conjunction with the step of substituting the first storage drive
for the spare storage drive of the drive array.

12. The method for updating the firmware of one or more storage drives of a drive array of claim 11, further comprising the steps of:

substituting the spare storage drive in the drive array for a storage drive having unupdated firmware;

5 building the content of the spare storage drive on the basis of the content of the remainder of the storage drives of the drive array; and

updating the firmware of the storage drive having unupdated firmware;

substituting the newly updated storage drive for the spare storage drive; and

10 providing a list of those addresses in the spare storage drive that include data that was modified during the period that the spare storage drive was substituted for the first storage drive; and

writing the contents of those addresses in the spare storage drive to the corresponding addresses in the first storage drive in conjunction with the step of substituting the first storage drive for the spare storage drive of the drive array.

15 13. The method for updating the firmware of one or more storage drives of a drive array of claim 12, wherein the steps set out in claim 15 are repeated until each storage drive of the drive array includes updated firmware.

20 14. The method of updating the firmware of one or more storage drives in a drive array of claim 15, wherein the step of building the content of a storage drive in the drive array is accomplished by performing, for each strip of data in the effected storage drive, an exclusive-OR calculation on the remainder of the strips of each stripe in the storage drives of the drive array.

15. A method for updating the firmware of one or more storage drives in a drive array, comprising the steps of:

updating the firmware of a spare storage drive;

5 substituting the spare storage drive in the drive array for a storage drive having
unupdated firmware;

updating the firmware of the storage drive having unupdated firmware;

substituting the newly updated storage drive for the spare storage drive; and

building the content of the newly updated storage drive on the basis of the content of
the remainder of the storage drives of the storage array.

10

16. The method for updating the firmware of one or more storage drives in a drive array of claim 15, wherein the steps set out in claim 15 are repeated until each storage drive of the drive array includes updated firmware.

15

17. The method of updating the firmware of one or more storage drives in a drive array of claim 15, further comprising the step of, upon a read to the spare storage drive, building the content of the accessed portion of the spare storage drive.

18. A method for updating the firmware of the storage drives of each drive array of a shared storage unit, comprising the steps of:

updating the firmware of a spare storage drive;

identifying a drive array having at least one storage drive with unupdated firmware;

5 substituting the spare storage drive for a storage drive having unupdated firmware;

updating the firmware of the selected storage drive;

replacing the spare storage drive with the selected storage drive;

repeating the steps of substituting the spare storage drive for a storage drive having unupdated firmware; updating the firmware of the selected storage drive; and building the content
10 of the selected storage drive until each drive of the identified storage array has updated firmware;
and

repeating the steps of identifying a drive array having at least one storage drive with unupdated firmware, substituting the spare storage drive for a storage drive having unupdated firmware; updating the firmware of the selected storage drive; and building the content of the
15 selected storage drive until all storage drives of all drive arrays in the shared storage unit include updated firmware.

19. The method for updating the firmware of the storage drives of each drive array of a shared storage unit of claim 18, further comprising, following the step of replacing the spare storage
20 drive with the selected storage drive, the step of building the content of the selected storage drive on the basis of the content of the other storage drives of the drive array;

20. The method for updating the firmware of the storage drives of each drive array of a shared storage unit of claim 18, further comprising the steps of:

providing a list of addresses modified in the spare storage drive during the period that the spare storage drive is included in the drive array; and

5 writing the content of the modified addresses of the spare storage drive to the corresponding addresses in the selected storage drive in conjunction with the step of replacing the spare storage drive with the selected storage drive.